



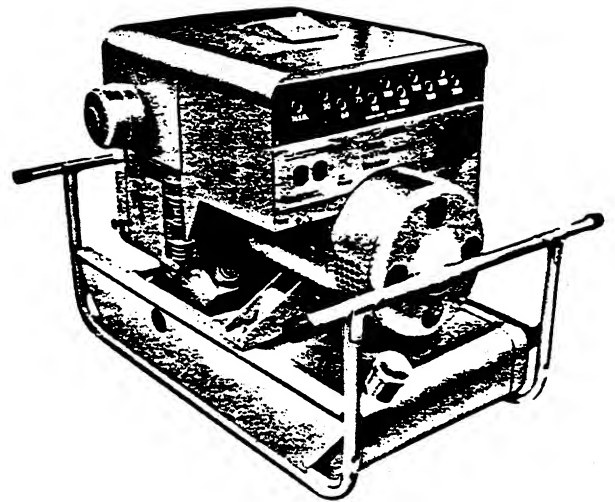
# Operators Manual

200 Portaweld®

CCK

Welder

- Gasoline Driven Welder
- Two Cylinder Air Cooled



# Important Safety Precautions

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Read and observe these safety precautions when using or working on electric generators, engines and related equipment. Also read and follow the literature provided with the equipment.

Proper operation and maintenance are critical to performance and safety. Electricity, fuel, exhaust, moving parts and batteries present hazards that can cause severe personal injury or death.

## FUEL, ENGINE OIL, AND FUMES ARE FLAMMABLE AND TOXIC

Fire, explosion, and personal injury can result from improper practices.

- Used engine oil, and benzene and lead, found in some gasoline, have been identified by government agencies as causing cancer or reproductive toxicity. When checking, draining or adding fuel or oil, do not ingest, breathe the fumes, or contact gasoline or used oil.
- Do not fill tanks with engine running. Do not smoke around the area. Wipe up oil or fuel spills. Do not leave rags in engine compartment or on equipment. Keep this and surrounding area clean.
- Inspect fuel system before each operation and periodically while running.
- Equip fuel supply with a positive fuel shutoff.
- Do not store or transport equipment with fuel in tank.
- Keep an ABC-rated fire extinguisher available near equipment and adjacent areas for use on all types of fires except alcohol.
- Unless provided with equipment or noted otherwise in installation manual, fuel lines must be copper or steel, secured, free of leaks and separated or shielded from electrical wiring.
- Use approved, non-conductive flexible fuel hose for fuel connections. Do not use copper tubing as a flexible connection. It will work-harden and break.

## EXHAUST GAS IS DEADLY

- Engine exhaust contains carbon monoxide (CO), an odorless, invisible, poisonous gas. Learn the symptoms of CO poisoning.
- Never sleep in a vessel, vehicle, or room with a genset or engine running unless the area is equipped with an operating CO detector with an audible alarm.
- Each time the engine or genset is started, or at least every day, thoroughly inspect the exhaust system. Shut down the unit and repair leaks immediately.

- Warning: Engine exhaust is known to the State of California to cause cancer, birth defects and other reproductive harm.

*Make sure exhaust is properly ventilated.*

- Vessel bilge must have an operating power exhaust.
- Vehicle exhaust system must extend beyond vehicle perimeter and not near windows, doors or vents.
- Do not use engine or genset cooling air to heat an area.
- Do not operate engine/genset in enclosed area without ample fresh air ventilation.
- Expel exhaust away from enclosed, sheltered, or occupied areas.
- Make sure exhaust system components are securely fastened and not warped.

## MOVING PARTS CAN CAUSE SEVERE PERSONAL INJURY OR DEATH

- Do not remove any guards or covers with the equipment running.
- Keep hands, clothing, hair, and jewelry away from moving parts.
- Before performing any maintenance, disconnect battery (negative [-] cable first) to prevent accidental starting.
- Make sure fasteners and joints are secure. Tighten supports and clamps, keep guards in position over fans, drive belts, etc.
- If adjustments must be made while equipment is running, use extreme caution around hot manifolds and moving parts, etc. Wear safety glasses and protective clothing.

## BATTERY GAS IS EXPLOSIVE

- Wear safety glasses and do not smoke while servicing batteries.
- Always disconnect battery negative (-) lead first and reconnect it last. Make sure you connect battery correctly. A direct short across battery terminals can cause an explosion. Do not smoke while servicing batteries. Hydrogen gas given off during charging is explosive.
- Do not disconnect or connect battery cables if fuel vapors are present. Ventilate the area thoroughly.

## **DO NOT OPERATE IN FLAMMABLE AND EXPLOSIVE ENVIRONMENTS**

Flammable vapor can be ignited by equipment operation or cause a diesel engine to overspeed and become difficult to stop, resulting in possible fire, explosion, severe personal injury and death. **Do not operate diesel equipment where a flammable vapor environment can be created by fuel spill, leak, etc., unless equipped with an automatic safety device to block the air intake and stop the engine.**

## **HOT COOLANT CAN CAUSE SEVERE PERSONAL INJURY**

- Hot coolant is under pressure. Do not loosen the coolant pressure cap while the engine is hot. Let the engine cool before opening the pressure cap.

## **ELECTRICAL SHOCK CAN CAUSE SEVERE PERSONAL INJURY OR DEATH**

- Do not service control panel or engine with unit running. High voltages are present. Work that must be done while unit is running should be done only by qualified service personnel.
- Do not connect the generator set to the public utility or to any other electrical power system. Electrocutation can occur at a remote site where line or equipment repairs are being made. An approved transfer switch must be used if more than one power source is connected.
- Disconnect starting battery (negative [-] cable first) before removing protective shields or touching electrical equipment. Use insulative mats placed on dry wood platforms. Do not wear jewelry, damp clothing or allow skin surface to be damp when handling electrical equipment.
- Use insulated tools. Do not tamper with interlocks.
- Follow all applicable state and local electrical codes. Have all electrical installations performed by a qualified licensed electrician. Tag open switches to avoid accidental closure.
- With transfer switches, keep cabinet closed and locked. Only authorized personnel should have cabinet or operational keys. Due to serious shock hazard from high voltages within cabinet, all service and adjustments must be performed by an electrician or authorized service representative.

If the cabinet must be opened for any reason:

1. Move genset operation switch or Stop/Auto/Handcrank switch (whichever applies) to Stop.
2. Disconnect genset batteries (negative [-] lead first).
3. Remove AC power to automatic transfer switch. If instructions require otherwise, use extreme caution due to shock hazard.

## **MEDIUM VOLTAGE GENERATOR SETS (601V TO 15kV)**

- Medium voltage acts differently than low voltage. Special equipment and training are required to work on or around medium voltage equipment. Operation and maintenance must be done only by persons trained and qualified to work on such devices. Improper use or procedures will result in severe personal injury or death.
- Do not work on energized equipment. Unauthorized personnel must not be permitted near energized equipment. Induced voltage remains even after equipment is disconnected from the power source. Plan maintenance with authorized personnel so equipment can be de-energized and safely grounded.

## **GENERAL SAFETY PRECAUTIONS**

- Do not work on equipment when mentally or physically fatigued or after consuming alcohol or drugs.
- Carefully follow all applicable local, state and federal codes.
- Never step on equipment (as when entering or leaving the engine compartment). It can stress and break unit components, possibly resulting in dangerous operating conditions from leaking fuel, leaking exhaust fumes, etc.
- Keep equipment and area clean. Oil, grease, dirt, or stowed gear can cause fire or damage equipment by restricting airflow.
- Equipment owners and operators are solely responsible for operating equipment safely. Contact your authorized Onan/Cummins dealer or distributor for more information.

**KEEP THIS DOCUMENT NEAR EQUIPMENT FOR EASY REFERENCE.**

# Safety Precautions

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**ALWAYS USE PRECAUTIONARY MEASURES DURING ARC WELDING OPERATIONS TO ENSURE MAXIMUM PERSONAL SAFETY AND THE SAFETY OF NEARBY PERSONNEL.**

**WARNING** This symbol is used throughout this manual to warn of possible serious personal injury.

**CAUTION** This symbol refers to possible equipment damage.

- **Operate and Maintain The Machine And Its Equipment Properly.**

Do not overload the cables. Do not use worn or poorly connecting cables. Do not allow the welding cables to contact hot metal, water, oil or grease. Prevent cables from becoming a stumbling hazard by keeping them in order and out of the way.

Use electrode holders that are completely insulated. Do not use holders with defective jaws.

Do not use the welder without grounding the frame or the case. Do not ground to pipelines carrying gases of flammable liquids. Be sure the conductors can safely carry the grounding current.

Keep all connections clean and tight.

Do not use an electric welder on an engine unless both the engine's battery cables and alternator wires are disconnected.

- **Take Precautions Against Electric Shock.**

NEVER work in a damp area without suitable insulation against shock.

NEVER stand in water or on a wet floor or use wet gloves when welding.

ALWAYS dry out the work pieces or bench if there is any evidence of moisture.

OPEN power circuits before inspecting machines.

ALWAYS turn off the machine when leaving the work.

- **Do Not Weld Near Flammable Materials.**

NEVER weld in or near EXPLOSIVE ATMOSPHERES.

Clean any container that has held combustible or flammable materials by approved or prescribed methods. A very small amount of residual gas or liquid can cause a serious explosion. When the contents of the container is unknown, use an explosimeter.

Use carbon dioxide or nitrogen to ventilate a container. NEVER USE OXYGEN.

When the container has held a gas or liquid that readily dissolves in water, perform the following:

1. Flush the container several times with water and a wetting agent (e.g., a low powered detergent). Then, fill with as much water as the work permits.
2. Provide a vent or opening in the container to allow the release of air pressure.

When the container has held a gas or liquid that does not readily dissolve in water, proceed as follows:

1. Clean the container with steam or a cleaning agent and purge all air with a gas such as carbon dioxide or nitrogen.
2. Use steam to clean out light material.
3. To clean out heavy grease or oil, use a strong caustic soda solution.
4. Before welding on the container, PURGE ALL AIR with a gas such as carbon dioxide or nitrogen.

Wear goggles and gloves when cleaning with steam or caustic soda.

Always clean the container in a well ventilated area, away from any open flame.

When scraping or hammering heavy sludge or scale, use a WET, spark resistant tool.

Always keep head and arms as far away from the work as possible.

- **Never Weld On Hollow (Cored) Castings That Have Not Been Properly Vented.**
- **Never Pick Up Hot Metal With Bare Hands.**
- **Do Not Weld In Confined Areas Without Adequate Ventilation.**
- **Never Wear Frayed, Flammable Or Otherwise Inadequate Clothing When Welding. Keep Clothing Dry.**

Avoid wearing light colored or open shirts that allow arc rays to penetrate and expose parts of the body to ultra-violet rays. Do not wear flammable cotton fabrics when arc welding. Wear heavy shoes, tightly laced.

To prevent severe burns from splatter and molten metal, wear leather or asbestos gloves at all times protecting the hand and wrists. When welding in

vertical and overhead positions, wear ear shields under helmet and leather sleevelets, apron, and leggings.

- **Use Eye Protection At All Times.**

ALWAYS wear safety goggles under the welding helmet. Keep the helmet, hand shields, and face shield in good condition. Replace defective equipment.

All arc welding produces intense ultra-violet and infra-red radiation. When welding in open areas, provide portable nonreflecting screens to protect nearby personnel from arc rays.

- **Do Not Work On This Equipment When Mentally Or Physically Fatigued.**
- **If the unit is mounted with wheels and is portable, chock the wheels before use to prevent movement from vibration.**

### WARNING

## **ENGINE EXHAUST GAS (CARBON MONOXIDE) IS DEADLY!**

*Carbon monoxide is an odorless, colorless gas formed by incomplete combustion of hydrocarbon fuels. Carbon monoxide is a dangerous gas that can cause unconsciousness and is potentially lethal. Some of the symptoms or signs of carbon monoxide inhalation are:*

- |                                  |                               |
|----------------------------------|-------------------------------|
| • <b>Dizziness</b>               | • <b>Vomiting</b>             |
| • <b>Intense Headache</b>        | • <b>Muscular Twitching</b>   |
| • <b>Weakness and Sleepiness</b> | • <b>Throbbing in Temples</b> |

***If you experience any of the above symptoms, get out into fresh air immediately.***

***The best protection against carbon monoxide inhalation is proper installation and regular, frequent inspections of the complete exhaust system. If you notice a change in the sound or appearance of exhaust system, shut the unit down immediately and have it inspected and repaired by a competent mechanic.***

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# General Information

## ABOUT THIS MANUAL

This manual provides complete information for operating, maintaining, and making adjustments to your Onan welder. Study this manual carefully and observe all warnings and cautions. Using your welder properly and following a regular maintenance program can result in longer unit life, better performance, and safer operation.

## WHEN SERVICE IS NEEDED

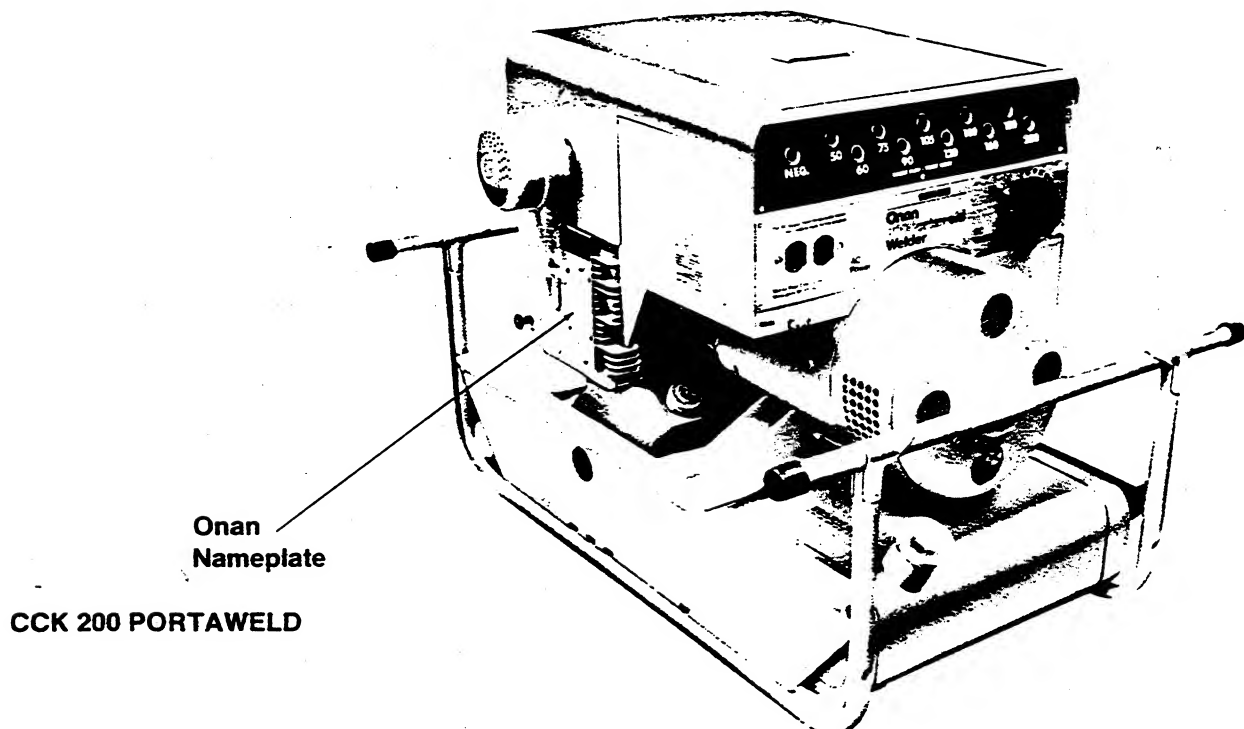
When your welder requires servicing, contact your Onan dealer or distributor for assistance. Onan's factory trained Parts and Service representatives are located throughout the United States and Canada and are ready to handle all your service needs.

When contacting your Onan Dealer or Distributor, always supply the complete Model and Spec No. and Serial No. as shown on the set nameplate. This information is necessary to identify the welder from among the many types of sets manufactured by Onan. Electrical characteristics are shown on the lower portion of the nameplate.

<b>McGraw-Hill</b>		
<b>Onan200Welder</b>		
Model and Spec No. _____		
Serial No. _____		
<b>Important:</b> Always give above numbers when ordering parts		
<b>DC Welder Rating</b>		
200 Amp at 28 Volts		
Range 50-200 Amps, 2700 RPM		
50% Duty Cycle at 200 Amps		
100% Duty Cycle at 140 Amps		
<b>AC Rating</b>		
kW at 100% Duty Cycle	Volts 1Ø	
Amps	Hz	RPM
For Elec		Bat.
Eqpt Only		
Onan Corp Minneapolis, Mn 55432 USA		
Made in USA 99-1587		

## WARNING

**ONAN RECOMMENDS THAT ALL SERVICE INCLUDING INSTALLATION OF REPLACEMENT PARTS ONLY BE DONE BY PERSONS QUALIFIED TO PERFORM ELECTRICAL AND/OR MECHANICAL SERVICE. TO PREVENT POSSIBLE INJURY AND/OR EQUIPMENT DAMAGE IT IS IMPERATIVE THAT THE SERVICE PERSON BE QUALIFIED.**



# Specifications

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## CCK 200 PORTAWELD

### GENERAL

Height .....	27.25 inches (692 mm)
Width .....	29.00 inches (737 mm)
Length .....	36.00 inches (914 mm)
Weight .....	430 pounds (195 Kg.)

### ENGINE DETAILS

Number of Cylinders (horizontal opposed) .....	2
Displacement .....	49.8 in <sup>3</sup> (816 cm <sup>3</sup> )
Compression Ratio .....	7 to 1
Engine Speed	
Welder Operation .....	2600 r/min
AC Operation (60 Hz) .....	1800 r/min

### GENERATOR DETAILS

Welding Range at 28 Volts .....	50-200 Amperes
AC Output	
50 Hertz .....	2.5 kW
60 Hertz .....	3.5 kW

### CAPACITIES AND REQUIREMENTS

Fuel .....	Regular or Unleaded Gasoline
Fuel Tank Capacity .....	7.3 gallons (27.8 litre)
Oil Capacity .....	4 quarts (3.8 litre)
Starting System Voltage .....	12
Battery Requirements	
BCI Group Size .....	U1
Cranking Perf. at 0°F .....	220 Amperes
Amp Hour Cap (20 hour rate) .....	32
Battery Voltage .....	12
Quantity Required .....	1

### TUNE-UP SPECIFICATIONS

Spark Plug Gap .....	.025 inches (0.64 mm)
Ignition Timing .....	20° BTC
Breaker Point Gap .....	.020 inches (0.51 mm)



# Installation

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## GENERAL

The Onan 200 Portaweld welder is primarily designed for outdoor applications where the exhaust gases and engine waste heat can be discharged directly into the open air. Do not operate the welder near an open window, door, air intake, or any other place where exhaust gases may enter the interior of a building. If it is necessary to install the welder in an enclosure or a mobile application, refer to the following sections for general installation recommendations.

Proper installation increases welder life, decreases operating costs, and reduces the frequency of necessary repairs. Plan installations carefully to ensure best welder performance and safety.

## VENTILATION

Welders generate considerable heat during operation. If operating welder in any small enclosure, provide separate, unobstructed air inlet and outlet openings (minimum area of 3-1/2 square feet [3252 cm<sup>2</sup>] each). Locate the inlet opening as close to the front of the engine as possible and provide an outlet opening toward the generator end somewhat higher than the inlet opening.

## EXHAUST

Pipe all exhaust gases to the outside if installing the generator in an enclosure. When mounting an extension exhaust pipe to the engine, use a piece of flexible tubing between the extension and the engine. Fit the muffler to the outer end of the exhaust pipe.

### **WARNING**

*Check exhaust system frequently for leaks. Be sure poisonous exhaust gases are piped to outside. Inhalation of exhaust gases can result in serious personal injury or death.*

Never operate the welder inside a building or confined area without piping exhaust gases outside the enclosure.

## MOBILE MOUNTING

When the welder is mobile mounted, extra vehicle floor support may be necessary to prevent the welder mounting bolts from disengaging because of rough roads, turning sharp corners, etc. Use pipe clamps or U-bolts to secure the welder frame to the floor. For servicing convenience (especially when draining the oil), elevate the welder above the vehicle floor. Maximum operation angle of the unit is 15 degrees sideways, 30 degrees front-to-rear.

## BATTERY CONNECTIONS (Optional)

Connect battery cable marked POS. to the battery positive (+) terminal. Connect unmarked cable to the battery negative (-) terminal. Always keep cable connections tight and clean.

# Operation

## INITIAL START

Fill the engine crankcase with oil and the fuel tank with fuel before attempting to operate the welder. Refer to the *MAINTENANCE* section for the lubricating oil and fuel recommendations. In addition, inspect new units for loose, missing, or damaged parts and correct as required.

**WARNING** To prevent hazardous gasoline spillage, never fill the tank when the engine is running and leave some fuel expansion space. Observe safety precautions when handling gasoline to prevent an explosion which may result in personal injury.

After filling the fuel tank, prime the fuel system on manual start models as follows:

1. Remove the engine and control cover.
2. Operate the fuel pump primer rod (Figure 1) approximately 15 complete strokes to fill the carburetor. Primer rod is not furnished on electric start models.

If the camshaft pump lobe is up, crank the engine one revolution to permit hand priming.

3. Return the priming rod to the downward position after priming and replace the engine and control cover.

The fuel system may also have to be primed if the welder has been idle long enough for the gasoline to evaporate from the carburetor.

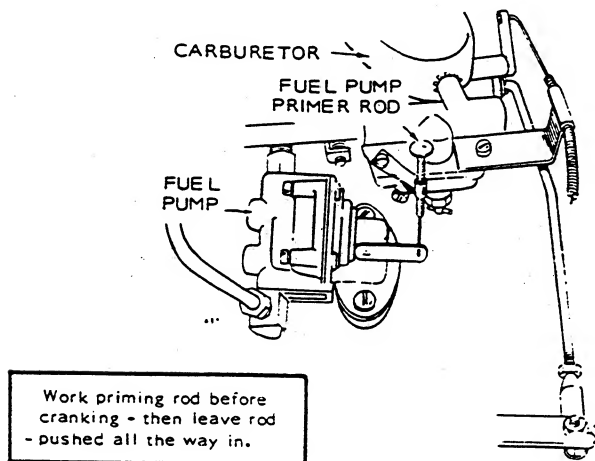


FIGURE 1. PRIMING FUEL PUMP

## STARTING

The CCK 200 Portaweld welder is equipped with either a Redi-Pull manual starter or with an electric starter. Electric start models can be started manually with a pull rope when necessary.

If the first attempt at starting the engine fails, the inhibitor oil used at the factory may have fouled the spark plugs—remove the plugs, clean in solvent, dry thoroughly and reinstall. When the engine is first started, heavy exhaust smoke is normal and is caused by the inhibitor oil.

### Manual Start

Refer to Figure 2 for the location of the choke control and ignition switch. No loads should be connected during starting.

1. Pull the choke control knob fully out if starting in cold temperatures. Partially choke the engine if the ambient temperature is high or if the engine is warm from previous operation.
2. Place the ignition switch in the *ON* position on electric start models and wind the starting rope on the flywheel sheave. Wind in a clockwise direction and leave about 6 inches (152 mm) of the rope end free for pulling.

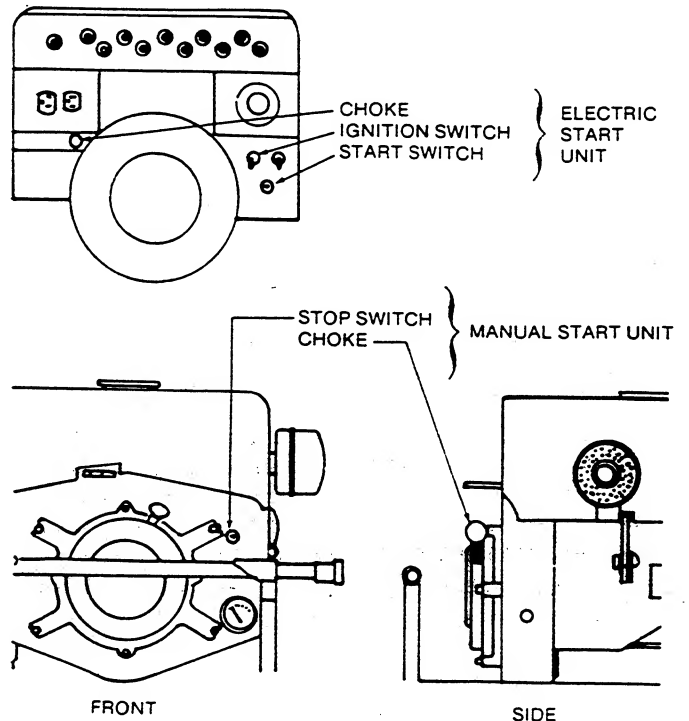


FIGURE 2. STARTING/STOPPING

3. Crank the unit with a rapid pull on the starting rope. **DO NOT JERK** the rope. If the unit does not start immediately, change the choke setting. Avoid over-choking as this can cause oil dilution that can result in excessive wear of the internal engine parts.
4. Adjust the choke control to the best running position as soon as the engine starts. Gradually push the choke all the way in as the engine warms up.

Setting the throttle control lever in the **POWER** position (1800 rpm) aids starting, especially in cold weather.

## Electric Start

On initial start (or if the unit has run out of fuel), it will be necessary to pump fuel to the carburetor. It usually takes about 30 revolutions to properly fill the carburetor.

Refer to Figure 2 for the location of the choke control, ignition switch, and Start switch.

1. Move ignition switch located on control panel to **ON** position. (The battery must be connected.)
2. Pull the choke control knob fully out if starting in cold temperatures. Partially choke the engine if the ambient temperature is high or if the engine is warm from previous operation.
3. Push **START** switch firmly. If unit does not start within a few seconds, release **START** switch and wait a few seconds before re-attempting. If unit does not start after second attempt, open choke and repeat starting sequence.
4. After unit starts, adjust choke to best running position. Gradually push choke control in as unit warms up.

## Oil Pressure

Check the engine oil pressure following start-up. Normal operating oil pressure is 20-35 psi (138-242 kPa). Pressure is higher until the engine warms up.

## STOPPING

Before stopping the engine, place the speed control lever in the **POWER** position and allow the engine to run at the lower speed for at least 30 seconds. If the engine speed control lever remains in the **WELD** position when the engine is stopped, restarting the engine may be difficult.

To stop a **MANUAL START** unit, press firmly on the **STOP** button (located on the engine blower housing) until the engine has come to a complete stop. If the **STOP** button is released too soon, the engine picks up speed again and continues to run.

To stop an **ELECTRIC START** unit, move the ignition switch (located on the control panel) to **OFF**.

## WELDER OPERATION

The following sections cover operation of the welder. The operator must be familiar with standard welding practices and procedures before attempting to use the welder.

### Duty Cycle

If the welder is operated at current levels greater than 140 amperes, it must be run at no-load for short periods of time to allow for cooling. The amount of no-load time required is dependent on the current being used. Figure 3 shows the percentage of no-load time required for each 10 minutes of operation at various current levels.

At 200 amperes rated load, the no-welding time must be at least one-half (50%) of each 10-minute operating period. As the welding load is reduced, longer welding time is permissible because less no-welding load time is required for the welder to cool. Any extreme ambient temperatures must also be taken into consideration. Continuous welding is permissible at 140 amperes or less.

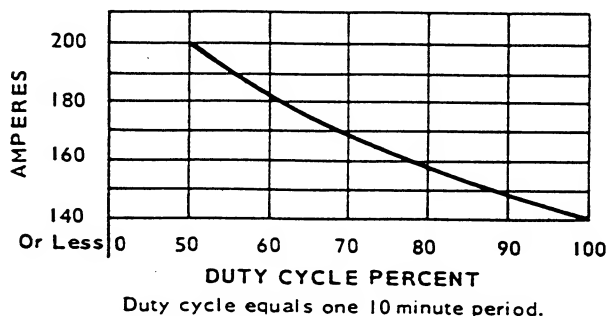


FIGURE 3. DUTY CYCLE CHART

### Welding Cable Connections

Insert welding cables into the main current amperage jack receptacles (Figure 4) according to the welding requirements. Some welding jobs may require frequent polarity changing to permit using various types of welding rod.

**Straight Polarity Welding:** Connect the electrode cable to the negative (**NEG.**) jack receptacle. Connect the ground cable to the desired amperage jack receptacle.

**Reverse Polarity Welding:** Connect the ground cable to the negative (**NEG.**) jack receptacle. Connect the electrode cable to the desired amperage jack receptacle.

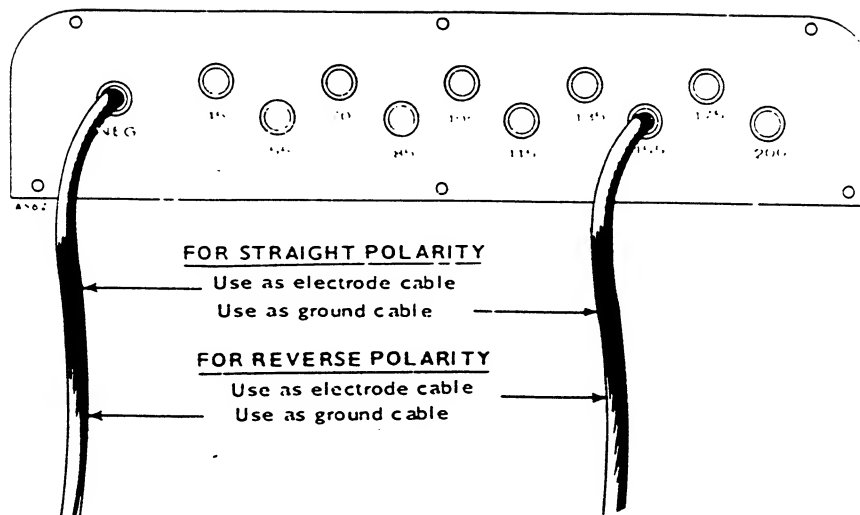


FIGURE 4. MAIN CURRENT WELDING JACK RECEPTACLES

### Electrodes

All 1/16-inch through 5/32-inch electrodes can be used. Positive and negative 3/16-inch electrodes which do not exceed the welder capacity can also be used.

### Welders In Parallel

Two welders can be connected in parallel if the welding amperage requirements are greater than those provided by one welder (see Figure 5).

1. Start both engines before connecting the cables to parallel the welders.
  - a. Adjust engines to same no-load speed. Use a tachometer or voltmeter for this adjustment.

**CAUTION** *If the welders are not adjusted to the same speed, the output will not double the current jack rating.*

- b. After engines are operating at the same speed, connect the paralleling cables to the proper jacks.

2. Determine welding current requirements. Select IDENTICAL current jack receptacles on each welder which total the ampere requirement.

EXAMPLE: If 300 amperes are required, select the 160 ampere receptacle on each welder. It may be necessary to select currents which total slightly higher than the welding requirements to obtain proper welding characteristics. This is due to voltage and current differences which occur when welders are connected in parallel and not running at the same speed.

Proper current can be obtained using the fine current control adjustment. Adjust to approximately the same setting on both welders.

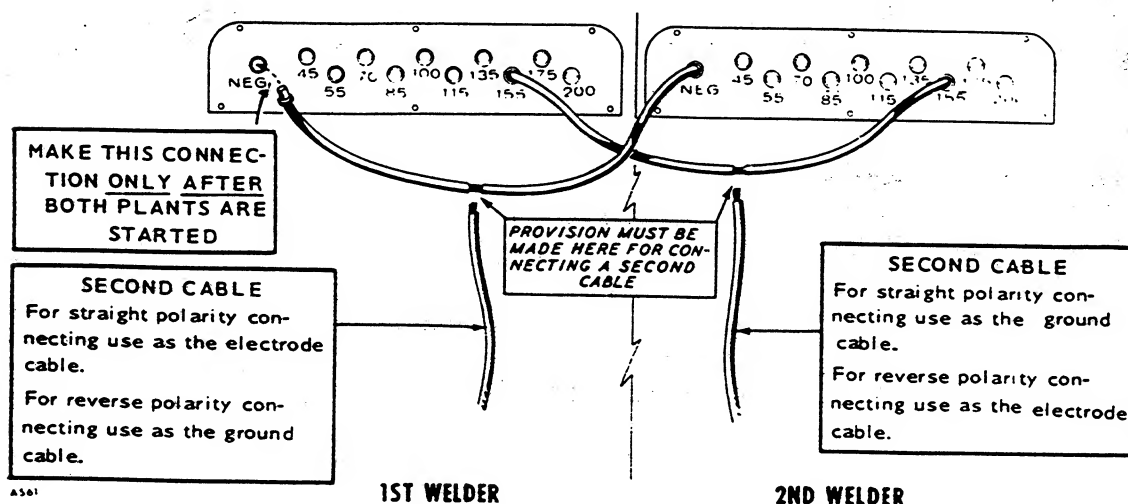


FIGURE 5. CONNECTIONS FOR WELDING IN PARALLEL

3. Large welding cables must be used because of the higher current. Consult your dealer, if in doubt, as to the welding cable size required.

- a. Connect a cable between the preselected *IDENTICAL* current jack receptacles of the welders. This cable (Figure 5) must have some means of attaching a second cable by splicing, clamping, etc., which will ensure a tight connection.
- b. Connect another cable (equal size and length) to the Negative jack receptacle of only one welder. **DO NOT** complete connection to NEG jack receptacle of second welder until both welders are running.

**CAUTION** *Do not attempt to parallel the welder's AC output. Serious control and welder damage will result.*

### Welding Current Adjustment

Welders have an engine speed control lever and a fine current adjustment control (Figure 6).

When the engine speed control lever is in the WELD position, AC output is cut off and only welding current is available. When the lever is in the POWER position, welding current is by-passed and only AC output is available.

The jack receptacle type main current control connects various resistance units into the welding circuit, limiting the amount of current at each jack receptacle. The fine current control provides for further adjustment between the jack receptacles of the main control.

**CAUTION** *NEVER WELD WITH ENGINE AND CONTROL COVER REMOVED! Considerable heat is generated by the resistance units inside the welder control box. Always keep the engine and control cover installed on the unit to properly direct cooling air to the control box.*

1. Plug cables into proper jack receptacles to obtain the amperage recommended for the electrode used.
2. Set fine current control at its approximate center position (midway between minimum and maximum). Try the welding characteristics, making fine current adjustments as necessary.

Fine current control range is greater than the current spread of the main current control jack receptacles. If perfect arc conditions are not obtained by normal procedure, try the next higher or lower jack receptacle connections and re-adjust the fine current control to compensate.

3. When operating welders in parallel (see WELDERS IN PARALLEL), always have both ends of the connection cables plugged into identical jack receptacles on each welder. If an amperage connection change is made on one welder, immediately connect the other end of the connecting cable to the same jack receptacle on the second welder.

If welding current cannot be adjusted satisfactorily, check for poor electrical contact of cable connections at welder, ground clamp, or electrode clamp.

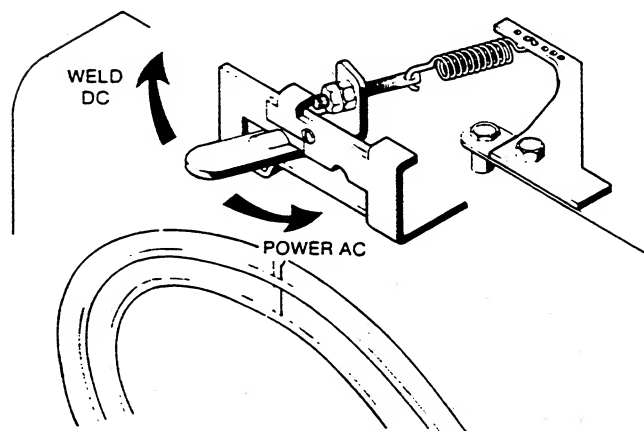
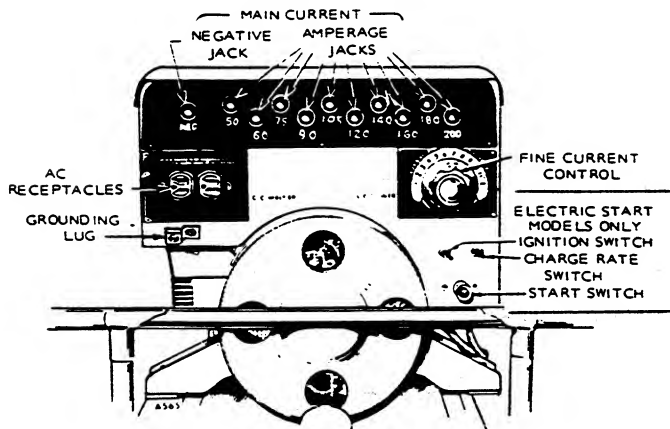


FIGURE 6. WELDER CONTROL

## AC OPERATION

Move the speed control lever to the POWER position (1800 rpm on 60 hertz models or 1500 rpm on 50 hertz models). This bypasses welding current control and supplies 120 (or 240) volts to the output receptacles. Limit AC loads to not more than 3500 watts, 60 hertz, or 2500 watts, 50 hertz.

### Grounding

For AC operation, the Onan 200 Portaweld welder has all non-current carrying metal parts electrically bonded and solidly connected to the generator neutral to meet National Electric Code requirements for AC generator sets. Local officials enforcing codes may require that the welder frame be electrically connected to a grounding electrode (water pipe, earth-driven grounding rod, etc.) during AC operation. Onan has provided a lug (Figure 6) for connecting the welder to a grounding electrode conductor if required.

#### **WARNING**

***A potentially lethal electric shock hazard exists if faulty electrical equipment is connected to the generator set. Check all electrical equipment for frayed cords or breaks in the insulation before using.***

Properly maintain all AC equipment used with the Onan welder. As a minimum measure of protection, use only 3-wire or double insulated equipment. All 3-wire equipment must be used only with properly maintained 3-wire extension cords. Additional backup protection (in case of a faulty equipment grounding wire or flawed insulation) can be provided by Ground Fault Circuit Interrupters (GFCI's). Onan recommends that where moisture or faulty cord-and-plug equipment may represent a hazard, GFCI's be used in addition to (but not instead of) the protection provided by 3-wire equipment or double insulation.

## BATTERY CHARGER OPERATION

When the welder is used infrequently, keep the Hi-Lo toggle switch in the Hi position to provide approximately a 2 ampere charge rate. Under normal operation, keep the switch in the Lo position—this provides a 1.5 ampere charge.

## OPERATING RECOMMENDATIONS

The following sections provide guidelines for break-in, severe environment operation, and extended storage.

### Break-In

A disciplined break-in procedure using the proper oil and employing a routine maintenance schedule helps to ensure satisfactory welder service.

Initial welder operation should be as follows:

1. One-half hour at 1/2 load (100 amps).
2. One-half hour at 3/4 load (150 amps).
3. Change crankcase oil after the first 50 hours of operation.

Following the recommended break-in procedure helps seat piston rings and brings oil consumption to normal in the shortest time. Refer to Duty Cycle section for loading intervals. Drain the oil while the engine is still hot after the first 50 hours of operation and replace with the recommended oil.

The welder is designed to operate with a load applied. When possible, avoid running the welder for extended periods of time without a load, especially during the first 50 hours of operation.

The valve lash should be adjusted after the first 50 hours of operation on new engines. Contact an authorized service center for assistance.

### Exercise Periods

Infrequent use results in hard starting. Operate welder for at least a half hour each week. Run longer if battery needs charging.

### High/Low Operating Temperatures

The welder has been designed to operate satisfactorily in both high (above 100°F/38°C) and low (below 0°F/-18°C) temperatures. Use the oil recommended in the MAINTENANCE section for the expected temperature conditions.

#### **High Temperatures:**

1. See that nothing obstructs air flow to and from the set.
2. Keep cooling fins clean. Cylinder air housings should be properly installed and undamaged.

#### **Low Temperatures:**

1. Use correct oil for temperature conditions. Change oil only when engine is warm. If an unexpected temperature drop causes an emergency, move the welder to a warm location or apply flameless heat externally until oil flows freely.
2. Use fresh, regular grade (not premium) gasoline. Protect against moisture condensation. Below 0°F, adjust the carburetor main jet for slightly richer fuel mixture.
3. Keep ignition system clean, properly adjusted, and batteries well-charged.

## Dusty or Dirty Conditions

1. Keep welder clean. Keep cooling fins free of dirt, etc.
2. Service air cleaner as frequently as necessary.
3. Change crankcase oil every 50 operating hours or less.
4. Keep oil and fuel in approved dust-tight containers.
5. Keep governor linkage clean.

## High Altitude Operation

When operating the welder at altitudes of 2500 feet (775 m) above sea level, slightly closing the carburetor main adjustment maintains proper air-to-fuel ratio (refer to the *ADJUSTMENTS* section). Maximum power reduces about 4 percent for each 1000 feet (310 m) above sea level after the first 1000 feet. Thus, at an altitude of 5000 feet (1550 m), the welder delivers about 160 amperes with proper carburetor adjustment.

## Out-Of-Service Protection

Protect a welder that will be out-of-service for more than 30 days as follows:

1. Run until thoroughly warm and then shut down.
2. Disconnect battery and follow standard battery storage procedure.
3. Drain oil from oil base while still warm. Refill and attach a tag stating oil viscosity used.
4. Remove each spark plug. Pour one ounce (two tablespoons) of rust inhibitor (or SAE #30 oil) into each cylinder. Crank engine slowly (by hand) several times. Install spark plugs.
5. Service air cleaner. See *MAINTENANCE* section.
6. Clean governor linkage and protect by wrapping with a clean cloth.
7. Plug exhaust outlet to prevent entrance of moisture, dirt, bugs, etc.
8. Remove access panels and clean all cooling surfaces.
9. Wipe entire unit. Coat rustable parts with a light film of grease or oil.
10. Provide a suitable cover for the entire unit.

## Returning Unit to Service:

1. Remove cover from unit and all protective wrapping.
2. Check tag on oil base and verify that oil viscosity is still correct for existing ambient temperatures.
3. Clean and check battery. Measure specific gravity (1.260 at 77°F [25°C]) and verify level to be at split ring. If specific gravity is low, charge until correct value is obtained. If the level is low, add distilled water and charge until specific gravity is correct. **DO NOT OVERCHARGE.**

### **WARNING**

***Do not smoke while servicing batteries. Explosive gases are emitted from batteries in operation. Ignition of gases can cause severe personal injury.***

4. Check that fuel filter and fuel lines are secure, with no leaks.
5. Connect battery. Connect ground lead last.
6. Be sure no load is connected to the welder.
7. Start engine.

## MICRO SWITCH TROUBLESHOOTING

The engine speed control lever governs micro switch operation. If the micro switch becomes stuck or otherwise inoperative, welder operation is vitally affected. If the welder develops any of the following problems, the micro switch is probably defective and should be replaced. Contact an Onan Dealer or Distributor for service.

1. If the micro switch DC contacts remain closed when the speed control lever is in the WELD position, welder voltage at no-load increases from a normal 60 volts (approximate) to 80 volts. At heavy welding load, speed drops excessively and appears to lack power.
2. If the micro switch DC contacts remain open when the speed control lever is in the POWER position, AC voltage is low, with similar low power performance.
3. If the micro switch AC contacts fail to close with the speed control lever in the POWER position, no AC output is available.
4. If the micro switch AC contacts remain closed with the speed control lever in the WELD position, AC output voltage is excessively high, and any AC load connected is damaged.

# Maintenance

Regularly scheduled maintenance is the key to lower operating costs and longer service life for the welder. The time intervals shown in the *Periodic Maintenance Schedule* should be used as a guide for regular maintenance. However, actual operating conditions should be the determining factor in establishing a maintenance schedule. When operating in very dusty or dirty conditions or hot and cold temperature extremes, the maintenance time intervals must be reduced.

## PERIODIC MAINTENANCE SCHEDULE

<div> <b>WARNING</b> Always allow welder to cool off before performing any maintenance.  Working on a hot unit could cause severe burns. </div> SERVICE THESE ITEMS	SERVICE TIME					
	8 Hours	50 Hours	100 Hours	200 Hours	500 Hours	1000 Hours
Inspect Welder	X <sup>1</sup>					
Check Fuel Level	X					
Check Oil Level	X					
Service Air Cleaner		X <sup>2</sup>				
Clean Governor Linkage		X <sup>2</sup>				
Service Spark Plugs			X			
Change Crankcase Oil			X <sup>2</sup>			
Check Battery Water Level			X			
Clean Crankcase Breather				X		
Clean Fuel Sediment Bowl				X		
Inspect Breaker Points				X		
Remove Carbon From Cylinder Heads					X <sup>3</sup>	
Check Valve Lash					X <sup>3</sup>	
Clean Welder						X

1. See Safe Operation Inspection section for procedure.
2. Perform more often in extremely dusty conditions.
3. This service should be performed by an Onan Dealer or Distributor.



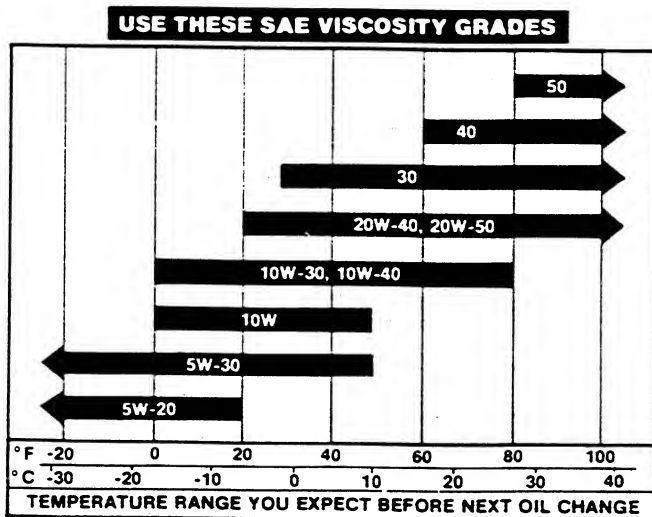
## LUBRICATION SYSTEM

The following sections cover crankcase oil recommendations, checking the oil level, and changing the oil.

### Crankcase Oil

Use an oil with the API (American Petroleum Institute) classification SE, SE/CB, or SE/CC. Oil should be labeled as having passed MS Sequence Tests (also known as having passed ASTMG-IV Sequence Tests). Refer to oil chart below for recommended viscosity according to temperature.

Oil consumption may be higher with a multigrade oil than with a single-grade oil if both oils have comparable viscosities at 210° F (99° C). Therefore, single grade oils are generally more desirable unless anticipating a wide range of temperatures.



When adding oil between oil changes, it is preferable to use the same brand as various brands of oil may not be compatible together. Refer to the Periodic Maintenance Schedule for recommended oil change intervals.

### Oil Level Check

Check the oil level indicator after every 8 hours of operation and maintain the oil level at the full mark (Figure 7). Refer to the SPECIFICATIONS section for crankcase capacity.

**WARNING** Do not remove the dipstick while the engine is running. Oil may blow out the oil fill tube causing injury.

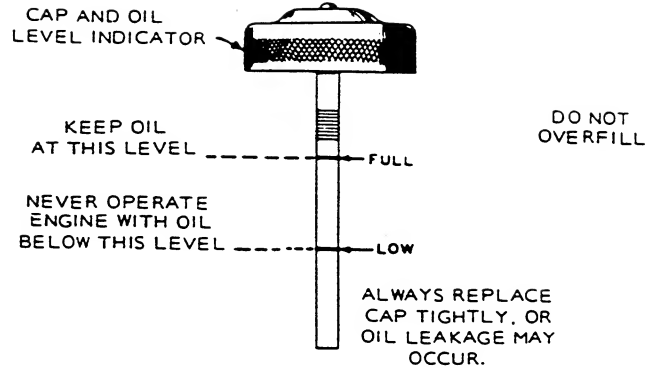


FIGURE 7. CHECKING OIL LEVEL

### Oil Change

Stop the engine and drain the crankcase oil while the engine is still hot. Place a pan under the drain outlet and remove the oil drain plug or open the oil drain valve. After the oil is completely drained, replace the drain plug or close the drain valve. Refill with oil of the correct API designation and the appropriate SAE viscosity grade for the temperature conditions.

## FUEL RECOMMENDATIONS

Use clean, fresh, regular grade, automotive gasoline. Do not use highly leaded premium types. For new engines, most satisfactory results can be obtained by using unleaded gasoline. For older engines that have previously used leaded gasoline, the heads must be taken off and all lead deposits removed from the engine before switching to unleaded gasoline.

**CAUTION** If lead deposits are not removed from engine before switching from leaded to unleaded gasoline, pre-ignition could occur causing severe damage to the engine.

**WARNING** To prevent hazardous gasoline spillage, never fill the tank when the engine is running and leave some fuel expansion space. Observe safety precautions when handling gasoline to prevent an explosion which may result in personal injury.

### BATTERY (Electric Start Model)

Check the condition of the starting battery at specified intervals. See that connections are clean and tight. A light coating of non-conductive grease will retard corrosion at terminals. Keep the electrolyte at the proper level above the plates by adding distilled water.

## SAFE OPERATION INSPECTION

Be alert for mechanical problems that could create unsafe or hazardous conditions. The following sections cover several areas that should be frequently inspected to insure continued safe operation.

**Exhaust System:** With the welder operating, inspect the entire exhaust system including the exhaust manifold and muffler. Check for leaks at all connections, welds, gaskets, and joints and also make sure that exhaust pipes are not heating surrounding areas excessively. If any leaks are detected, have them corrected immediately.

**WARNING** Check exhaust system frequently for leaks. Be sure poisonous exhaust gases are piped to outside. Inhalation of exhaust gases can result in serious personal injury.

**Fuel System:** With the welder operating, inspect the fuel supply lines and fittings for leaks. Check any flexible sections for cuts, cracks and abrasions and make sure they are not rubbing against anything that could cause breakage. If any leaks are detected, have them corrected immediately.

**DC Electrical System:** Check the terminals on the battery for clean and tight connections. Loose or corroded connections create resistance which can hinder starting. Clean and reconnect the battery cables if loose. Always connect the negative battery cable last to reduce the possibility of arcing.

**WARNING** Batteries emit hydrogen, a highly explosive gas. Do not smoke or create electrical sparks while servicing a battery to prevent a possible explosion.

**Mechanical:** With the welder stopped, check for loose fittings, leaking gaskets, or any signs of mechanical damage. If any problems are found, have them corrected immediately. With the set running, listen for any unusual noises that may indicate mechanical problems and check the oil pressure frequently. Investigate anything that indicates possible mechanical problems.

## AIR CLEANER

The CCK welder engine has a replaceable air cleaner cartridge. Remove the cartridge and shake out every 50 hours. After 200 hours of operation, remove the air cleaner cartridge element and replace with a new one (Figure 8).

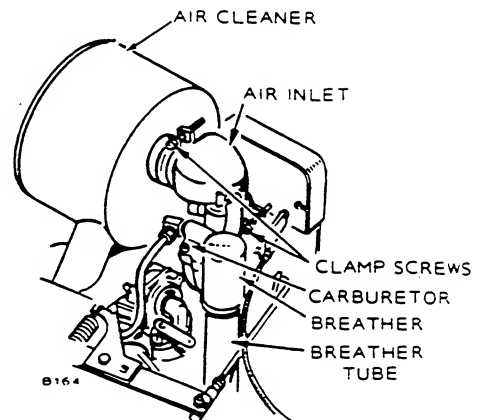


FIGURE 8. AIR CLEANER

## CRANKCASE BREATHER

Lift off the rubber breather cap and carefully pry valve from cap (Figure 9). Wash and rinse the whole valve in a suitable solvent. Dry the valve and re-insert. Be sure the valve flapper is toward the engine.

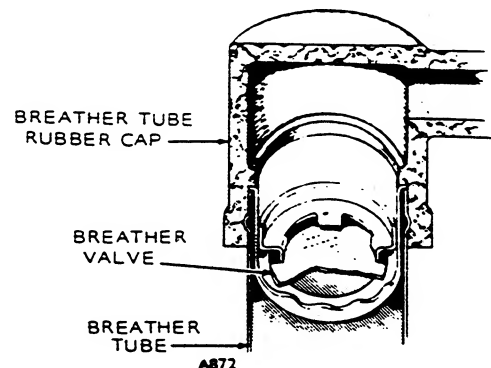


FIGURE 9. CRANKCASE BREATHER

## GOVERNOR LINKAGE

The linkage must be able to move freely through its entire travel. Every 50 hours of operation, clean the joints and lubricate as shown in Figure 10. Also inspect the linkage for binding, excessive slack and wear.

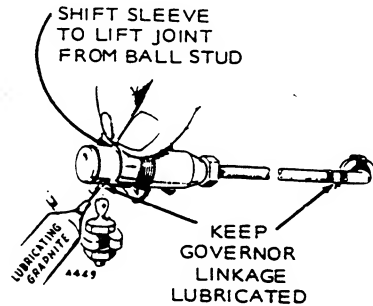


FIGURE 10. GOVERNOR LINKAGE

## SPARK PLUGS

Check, clean and reset spark plugs every 100 hours of operation. See Figure 11. Replace spark plugs that show signs of fouling or electrode erosion. Spark plug gap is 0.025 inch (0.64 mm). Replace plugs at least every 200 hours of operation. The use of unleaded gasoline will extend spark plug life.

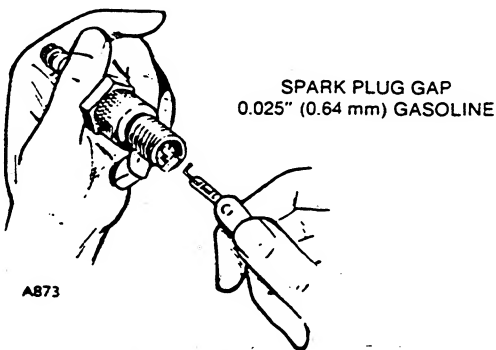


FIGURE 11. SPARK PLUG SERVICE

# Adjustments

## CARBURETOR ADJUSTMENTS

Before adjusting the carburetor, be sure the ignition system is working properly and the governor is adjusted. Allow the engine to warm up before starting carburetor adjustments.

If carburetor is completely out of adjustment so the engine will not start, open both adjustment screws counterclockwise 1 to 1-1/2 turns off their seats to permit starting. Do not force the needles against their seats. This can bend the needle.

Adjusting the carburetor means obtaining the correct fuel-to-air mixture for smooth, efficient operation. Always adjust in two steps, first the load adjustment and then the idle adjustment.

### Load Adjustment

1. Apply a full load to the welder.
2. Loosen packing nut as shown in Figure 12. Turn the main adjustment screw in (clockwise) until engine speed drops and then out (counterclockwise) until engine speed returns to normal.

**CAUTION** Loosen the packing nut before making main fuel adjustment and then tighten the nut to a snug fit after adjustment has been made. This procedure prevents fuel leaks around the packing nut. Fuel leaks cause hard starting because the float level becomes lower than normal.

3. Check the main mixture adjustment by removing and adding a heavy load. The engine should operate smoothly and without hesitation. If it does not, turn the main adjustment screw out in 1/8 turn increments until the engine operates smoothly but do not turn it out more than 1/2 turn beyond the original setting.
4. Remove load from welder and tighten the packing nut.

### Idle Adjustment

1. Remove all loads from the welder.
2. Turn the idle adjustment screw in (clockwise) until engine speed drops and then out (counterclockwise) until engine speed returns to normal and engine runs smoothly.

**CAUTION** Forcing the mixture adjustment screws tight will damage the needle and seat. Turn in only until light tension can be felt.

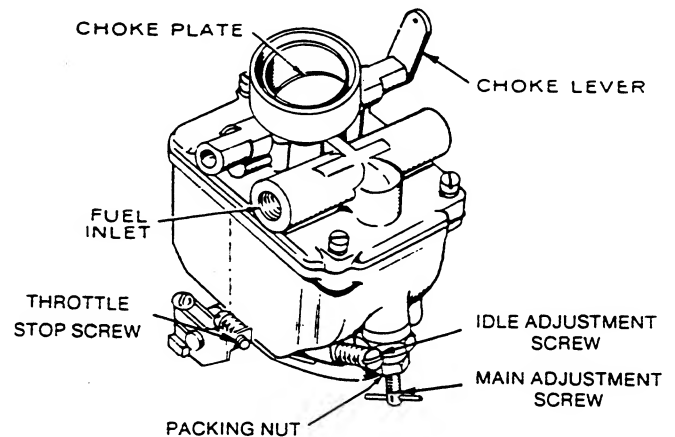


FIGURE 12. CARBURETOR ADJUSTMENTS

### Throttle Stop Screw Adjustment

Set the throttle stop/screw (on the throttle shaft lever) to clear the manifold surface by 1/32 inch when the engine is operating at 1800 rpm with no electrical load connected (see Figure 13).

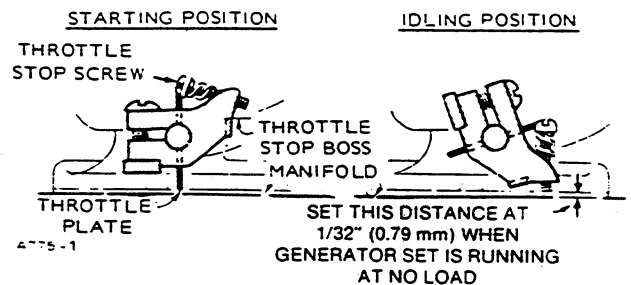


FIGURE 13. THROTTLE STOP SCREW ADJUSTMENTS

## GOVERNOR ADJUSTMENTS

The governor keeps engine speed nearly constant, regardless of the load. Nominal welding speed is 2500 rpm. When the engine speed control lever is in the **POWER** position for AC output, engine speed is about 1800 (60 hertz) or 1500 rpm (50 hertz) depending on the particular unit.

Before making any governor adjustment, see that the carburetor is properly adjusted. Check engine speed with a tachometer. Be sure welder is thoroughly warmed up. Refer to Figure 14.

1. Check length of linkage (A) that connects governor arm and carburetor throttle arm. This linkage synchronizes the governor arm travel with the carburetor throttle. If the original factory adjustment has been disturbed, adjust the length so that with the engine stopped and tension on the governor spring, the carburetor throttle lever stop is just touching the bottom surface of the carburetor body. Then, turn governor ball joint (B) about two more complete turns to shorten linkage (A). Now tighten locknut.
2. Set engine speed control lever (C) to *POWER* position, where lever boss (D) engages notch (E) in lever bracket (L).
3. Adjust spring tension to produce engine speed of about 1850 rpm (1550 rpm on 50 hertz models) at no-load. Spring tension is adjusted by loosening locknuts (F) and turning the inner nut on spring adjusting stud (M). This determines engine speed for AC operation.

4. Pull engine speed control lever to *WELD* position. The speed should be about 2700 rpm at no-load. If speed is not about 2700 rpm, loosen the two nuts (G) holding the adjusting plate (H), and slide the plate either in or out to gain the desired speed. Retighten nuts.

5. Check engine speed while welding at maximum current. Engine speed at full welding load should be about 200 rpm lower (about 2500 rpm) than no-load speed. If speed drop is excessive, move governor spring (J) in towards the governor arm one or more notches on spring bracket (K) until speed drop is about 200 rpm. This requires a new speed adjustment; repeat steps 2, 3, and 4.

If the spring is moved in too far, the engine "hunts" (alternately increases and decreases in speed). If hunting develops before speed drop is reduced by 200 rpm, try correcting it by slightly enriching the carburetor adjustment. Do not turn the carburetor main adjustment needle out more than 1/2 turn past its original full power setting.

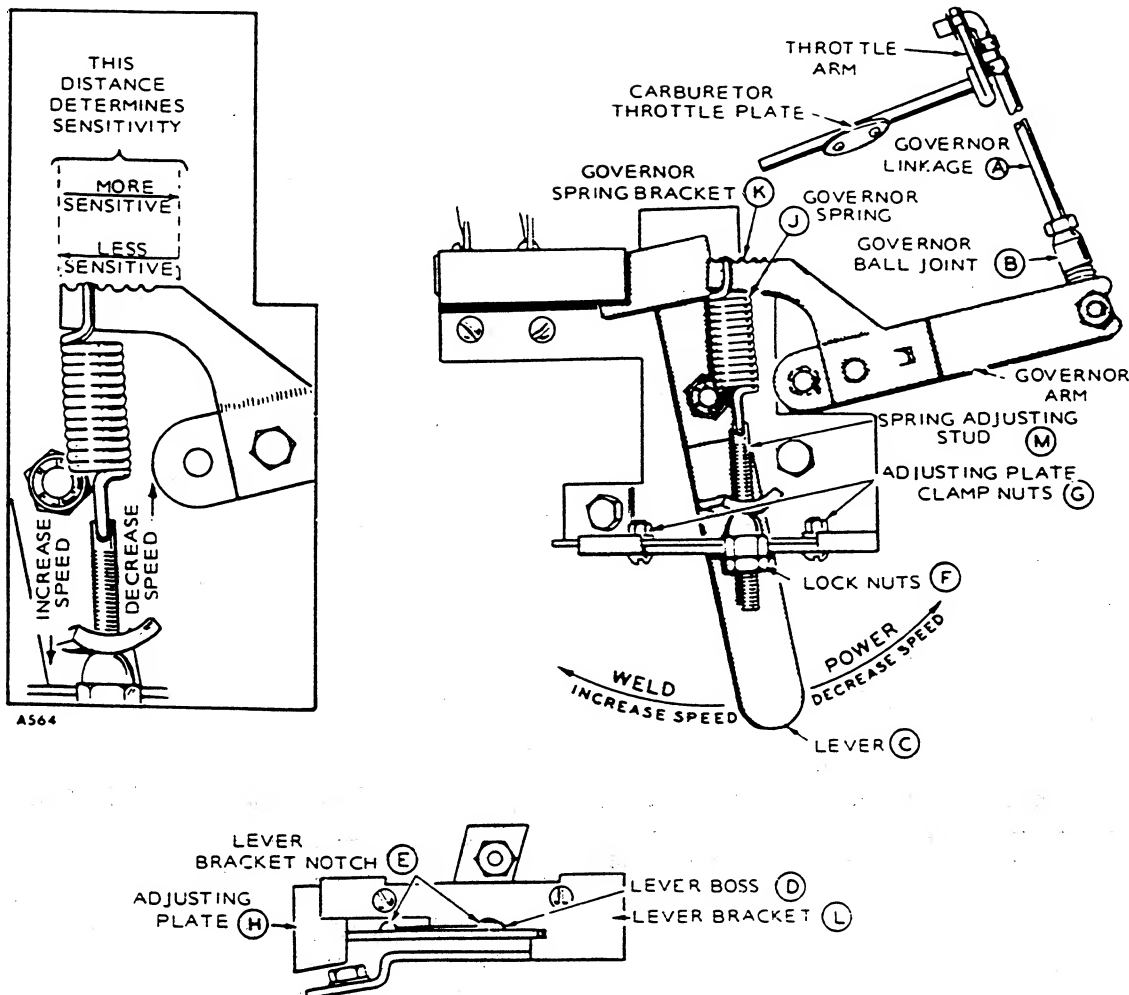


FIGURE 14. GOVERNOR AND GOVERNOR LINKAGE

## BREAKER POINT ADJUSTMENT

To adjust or replace the ignition breaker points (Figure 15) proceed as follows:

1. Remove breaker box cover and spark plugs.
2. Remove two mounting screws (A) and pull point set out of box just far enough so screw (B) can be removed. See Figure. Replace points and condenser set. Do not completely tighten mounting screws (A).
3. Rotate crankshaft clockwise (facing flywheel) until points are fully open. Turn screw (C) until point gap measures 0.020 inch (0.51 mm) with a flat thickness gauge.
4. Tighten mounting screws (A) and recheck point gap. Place one drop of oil on breaker point pivot.
5. Replace spark plugs (gapped at 0.025 inch [0.64 mm]).
6. Start engine and check timing.
7. Replace breaker box cover.

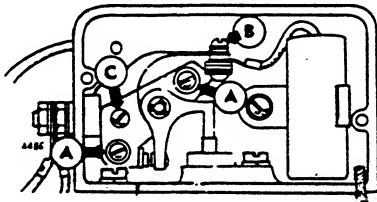


FIGURE 15. BREAKER POINT ADJUSTMENT

## IGNITION TIMING ADJUSTMENT

Adjust ignition timing to 20° BTC by proceeding as follows:

1. Remove cover from breaker box. If timing is substantially off, attain an approximate setting by loosening the mounting screws and shifting the breaker box (and spacer if used) to align the witness marks on cylinder block and breaker box (or spacer).
2. Slowly crank engine by hand in clockwise direction (normal crankshaft rotation) until witness mark on flywheel and TC mark on gear cover are exactly in line (Figure 16).
3. Adjust ignition breaker point gap to .020 inch (0.51 mm) at full separation.

4. Turn flywheel counterclockwise (against crankshaft rotation) until timing mark is about two inches past 25 degree mark on gear cover.
5. Slowly turn flywheel clockwise and note whether ignition points just separate when TC mark on flywheel aligns with correct degree mark on gear cover. Use a continuity light to determine the exact moment of point separation. If the marks align as the points break, timing is correct. If they do not, loosen the breaker box mounting screws and shift the whole breaker box assembly slightly.
6. Tighten breaker box mounting screws securely after making an adjustment (Figure 16).

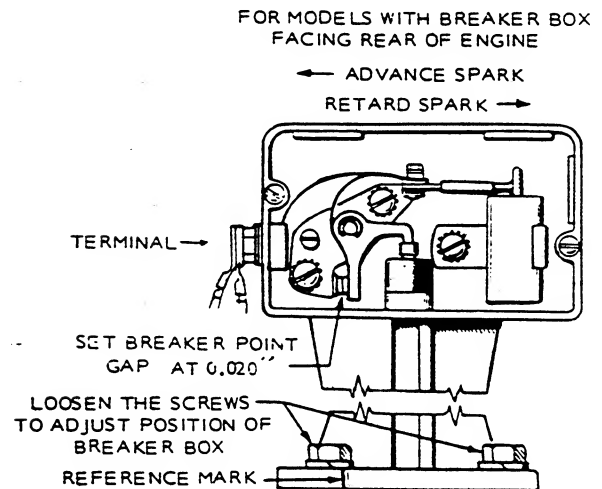


FIGURE 16. IGNITION TIMING

TROUBLE																			GASOLINE ENGINE TROUBLESHOOTING GUIDE																		
Backfire at Carburetor	Bearing Wear	Black Exhaust	Blue Exhaust	Burned Valves	Connecting Rod Wear	Cylinder Rod Wear	Engine Stalls	Failure to Start	Governor Hunting	High Oil Pressure	Loss of Coolant (Water Cooled)	Misfiring	Overheating (Water Cooled)	Overheating (Air Cooled)	Piston Wear	Poor Compression	Ring Wear	Sticking Valves	CAUSE																		
																			STARTING SYSTEM																		
																			Loose or Corroded Battery Connection																		
																			Low or Discharged Battery																		
																			Faulty Starter																		
																			Faulty Start Solenoid																		
																			IGNITION SYSTEM																		
																			Ignition Timing Wrong																		
																			Wrong Spark Plug Gap																		
																			Worn Points or Improper Gap Setting																		
																			Bad Ignition Coil or Condenser																		
																			Faulty Spark Plug Wires																		
																			FUEL SYSTEM																		
																			Out of Fuel - Check																		
																			Lean Fuel Mixture - Readjust																		
																			Rich Fuel Mixture or Choke Stuck																		
																			Engine Flooded																		
																			Poor Quality Fuel																		
																			Dirty Carburetor																		
																			Dirty Air Cleaner																		
																			Dirty Fuel Filter																		
																			Defective Fuel Pump																		
																			INTERNAL ENGINE																		
																			Wrong Valve Clearance																		
																			Broken Valve Spring																		
																			Valve or Valve Seal Leaking																		
																			Piston Rings Worn or Broken																		
																			Wrong Bearing Clearance																		
																			COOLING SYSTEM (AIR COOLED)																		
																			Poor Air Circulation																		
																			Dirty or Oily Cooling Fins																		
																			Blown Head Gasket																		
																			COOLING SYSTEM (WATER COOLED)																		
																			Insufficient Coolant																		
																			Faulty Thermostat																		
																			Worn Water Pump or Pump Seal																		
																			Water Passages Restricted																		
																			Defective Gaskets																		
																			Blown Head Gasket																		
																			LUBRICATION SYSTEM																		
																			Defective Oil Gauge																		
																			Relief Valve Stuck																		
																			Faulty Oil Pump																		
																			Dirty Oil or Filter																		
																			Oil Too Light or Diluted																		
																			Oil Level Low																		
																			Oil Too Heavy																		
																			Dirty Crankcase Breather Valve																		
																			THROTTLE AND GOVERNOR																		
																			Linkage Out of Adjustment																		
																			Linkage Worn or Disconnected																		
																			Governor Spring Sensitivity Too Great																		
																			Linkage Binding																		





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